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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/392,722	09/09/99	AKAMATSU	T 950637B

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EXAMINER

GRAYBILL, D

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 09/26/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

## Office Action Summary

Application No.  
**09/392,722**

Applicant(s)  
**Akamatsu et al.**

Examiner  
**David E. Graybill**

Group Art Unit  
**2814**



☒ Responsive to communication(s) filed on 30 Jun 1900

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

### Disposition of Claims

☒ Claim(s) 17-21 and 25-36 is/are pending in the application.

Of the above, claim(s) 27-36 is/are withdrawn from consideration.

☐ Claim(s) \_\_\_\_\_ is/are allowed.

☒ Claim(s) 17-21, 25, and 26 is/are rejected.

☐ Claim(s) \_\_\_\_\_ is/are objected to.

☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

### Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been  
☐ received.

☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

### Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 3

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

Art Unit: 2814

Applicant's election without traverse of Group I, claims 17-21, 25 and 26 in Paper No. 5 is acknowledged.

Claims 27-36 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The amendment filed 9-9-99 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is the amendment to page 15, last line.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 17-21, 25 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 17, 18, and 21 the recitation of an alloy having ~~A~~ particular properties without specification of the particular alloying composition ranges has been held to be merely functional,

Art Unit: 2814

hence indefinite, because it defines the alloy in terms of its properties rather than in terms of its composition. See *Koebel et al. v. Coe*, 41 USPQ 759.

In claim 21, the limitation, "wherein the soldering metal alloy of the electric connection is comprised of additional minor components" is improper because claim 19 is limited to a group consisting not of additional minor components.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 17, 18 and 25 are rejected under 35 U.S.C. 102(a) as being anticipated by Nelson (5328087).

At column 1, line 64 to column 2, line 9; column 5, line 42 to column 6, line 39; column 7, line 21 to column 8, line 27; column 10, lines 12-33; column 13, line 64 to column 14, line 13; column 14, lines 43-56; and column 15, lines 1-3, 11-14, and 21-24, Nelson teaches the following:

17. A method for fabricating an integrated electronic device having an electric connection connecting a first electrode of a first substrate with a second electrode of a second substrate, both surfaces of the first and second electrodes having an adhesive tendency to molten metal, the method comprising the steps of: forming a metal bump 32 on the surface of the first electrode 22, the metal bump being made of a soldering metal alloy consisting of a solid phase component and a

Art Unit: 2814

liquid phase component at an operating temperature; and forming an electric connection between the first electrode and the second electrode 20 by heating the soldering metal alloy so as to adhere to the surface of the second electrode.

18. A method for fabricating an integrated electronic device according to claim 17, wherein the soldering metal alloy consists of metal components same as metal components of an eutectic alloy and that a mixing ratio of the soldering metal alloy is deviated from a mixing ratio of the eutectic alloy, and an eutectic temperature of the eutectic alloy is lower than an operating temperature of the integrated electronic device.

25. A method for fabricating an integrated electronic device according to claim 17, wherein the first substrate is a semiconductor chip and the second substrate is a circuit board.

Although Nelson does not appear to explicitly teach wherein the soldering metal alloy consists of metal components same as metal components of an eutectic alloy and that a mixing ratio of the soldering metal alloy is deviated from a mixing ratio of the eutectic alloy, and an eutectic temperature of the eutectic alloy is lower than an operating temperature of the integrated electronic device, it is inherent in the process of Nelson that the gallium/indium soldering metal alloy consists of metal components same as metal components of an eutectic alloy, and an eutectic temperature (5°C) of the eutectic alloy is lower than an operating temperature (85°C) of the integrated electronic device. Furthermore, because “the proportions of liquid metal and particulate solid constituents remain between the ultimate liquidus and the ultimate solidus of the

Art Unit: 2814

phase diagram of the mixture," it is inherent that a mixing ratio of the soldering metal alloy is deviated from a mixing ratio of the eutectic alloy.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 19-21 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelsen (5328087).

Nelson is applied to claims 19-21 and 26 for the reasons supra.

At column 14, lines 54-56, Nelson teaches a method for fabricating an integrated electronic device using a Bi-Cd soldering metal.

However, Nelson does not appear to explicitly teach the following:

Art Unit: 2814

19. A method for fabricating an integrated electronic device according to claim 18, wherein the soldering metal alloy is selected from the group consisting of a binary alloy of In-Bi, a tertiary alloy of Sn-Bi-In and four element alloy of Sn-Pb-Bi-In.

21. A method for fabricating an integrated electronic device according to claim 19, wherein the soldering metal alloy of the electric connection is comprised of additional minor components that are harmless for the soldering metal alloy to have the liquid phase component at an operating temperature of the integrated electronic device.

Notwithstanding, at column 2, lines 3-8, Nelson teaches a conventional process of using non-eutectic In-Bi soldering metal alloy. Moreover, it would have been obvious to combine the conventional non-eutectic In-Bi soldering metal alloy with the process of Nelson because it would provide a soldering metal alloy consisting of a solid phase component and a liquid phase component at an operating temperature.

In addition, at "Table I", and column 6, lines 3-5, Nelson teaches a method for fabricating an integrated electronic device wherein the soldering metal alloy is In-Bi and is comprised of additional minor components (mercury and cadmium) that are harmless for the soldering metal alloy to have the liquid phase component at an operating temperature of the integrated electronic device.

The prior art made of record and not applied to the rejection is considered pertinent to applicant's disclosure. It is cited primarily to show processes of manufacturing a semiconductor package similar to the process of the instant invention.

Application/Control Number: 09392722

Page 7

Art Unit: 2814

**Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to the group receptionist at (703) 308-1782.**

Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (703) 308-2947. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m..

The fax phone number for group 2800 is (703)305-3431.



David E. Graybill  
Primary Examiner  
Art Unit 2814

D.G.